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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/817,287	03/27/2001	Nobuo Kochi	059277/0106	7739
22428	7590	04/22/2005	EXAMINER	
FOLEY AND LARDNER SUITE 500 3000 K STREET NW WASHINGTON, DC 20007			KIM, CHONG R	
			ART UNIT	PAPER NUMBER
			2623	

DATE MAILED: 04/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/817,287

Applicant(s)

KOCHI ET AL.

Examiner

Charles Kim

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 October 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in-condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 and 14-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 11 and 14-21 is/are allowed.
- 6) ☒ Claim(s) 1-10, 22-27 and 29 is/are rejected.
- 7) ☒ Claim(s) 28 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 March 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment and Arguments

1. Applicant's amendment filed on October 18, 2004 has been entered and made of record.
2. In view of applicant's amendment, the claim objections are withdrawn.
3. Applicant's arguments have been fully considered, but they are not deemed to be persuasive for at least the following reasons.

Applicants argue (page 13) that their claimed invention (claim 1) differs from the prior art because "Otani does not disclose or suggest, however, that the points of the characteristic pattern are measured, and therefore they are not known points." The Examiner disagrees. Otani clearly discloses that the points of the characteristic pattern are measured on page 5, lines 19-23. For example, Otani states that the "characteristic pattern coordinate points in the characteristic pattern image memory 54 are detected by a characteristic pattern position detecting portion 55." Therefore, it appears that the points of the characteristic pattern in Otani are measured, and are considered known points.

Applicant's further argue (page 13) that "Otani fails to disclose or suggest that the search area is triangular." The Examiner admits that Otani does not disclose a triangular search area. However, as noted in the previous office action (pages 5-6), triangular search areas were exceedingly well known in the art. For example, Tanaka discloses a search area that is triangular (col. 13, lines 32-63 and figure 12). Tanaka explains that a rectangular search area can be modified into a triangular search area based on three division points selected from a plurality of

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set division points. Accordingly, the combination of Otani and Tanaka disclose a triangular search area, and therefore, appear to be applicable to claim 1 as amended.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-3, 5-6, 8-9, 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Otani et al., EP Patent Application No. EP 0 880 010 A2 ("Otani") and Tanaka et al., U.S. Patent No. 5,943,442 ("Tanaka").

Referring to claim 1, Otani discloses a stereo image measuring device comprising:

- a. a setting unit for setting, regarding a stereo image including at least three or more points of measurements having position data thereof obtained (page 5, lines 17-25), at least a part of the point of measurement as division points, and then setting a search area based on at least three division points selected from a plurality of the set division points (page 8, lines 2-15)
- b. an arithmetic operation unit for executing correlation processing for images of search areas corresponding to each other on the stereo image based on the search area set by the setting unit (page 7, lines 52-55 and page 10, lines 15-28)
- c. a measuring unit for measuring a (three-dimensional) coordinate of a point of a given position from a result of the correlation executed by the arithmetic operation unit [page 7,

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lines 34-54. Otani explains that the characteristic patterns on the reference image and the corresponding points on the search image that are determined by the correlation process (stereo matching) are utilized to determine the three-dimensional coordinates of the characteristic patterns].

Otani does not explicitly disclose that three division points are selected from the obtained division points to form a triangular search area (Note that Otani's search area is based on the division points but comprises a rectangle, see figure 10). However, this feature was exceedingly well known in the art. For example, Tanaka explains that a rectangular search area (NESW) can be divided into four triangular regions, and set as the search area based on three division points (col. 13, lines 32-63 and figure 12).

Otani and Tanaka are combinable because they are both concerned with image matching systems. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the rectangular search area of Otani, so that it comprises a triangular search area, as taught by Tanaka. The suggestion/motivation for doing so would have been to enhance the image matching process by providing fast production of highly reliable search results (Tanaka, col. 2, lines 15-18). Therefore, it would have been obvious to combine Otani with Tanaka to obtain the invention as specified in claim 1.

Referring to claim 2, Tanaka further discloses the step of selecting three division points from division points to form a division triangle, and setting a search area based on the division triangle (col. 13, lines 32-63 and figure 12).

Referring to claim 3, see the rejection of at least claim 2 above. Otani further discloses that the setting unit sets, in each stereo image, an inclusion square (R1 or R2) as a search area [page 8, lines 2-5 and figure 10].

Otani does not explicitly disclose that the inclusion square includes a triangle composed of three adjacent points selected from the division points. However, Tanaka discloses a search area that comprises an inclusion square that includes a triangle, as noted above. Therefore, it would have been obvious to combine the teachings of Otani and Tanaka for the reasons stated above (claim 1).

Referring to claim 5, Otani further discloses that the setting unit sets a reference data block (T1, T2, T3) in the search areas of a first image of the stereo image, and a search data block (U1, U2, U3) in the search area of a second image of the stereo image, and then sets a position of a search data block according to a distance from the deviation point (page 8, lines 30-44 and figures 9 and 13).

Referring to claim 6, Otani further discloses that the setting unit sets a reference data block (T1, T2, T3) in the search areas of a first image of the stereo image, and a search data block (U1, U2, U3) in the search areas of a second image of the stereo image, and then sets a size of a search data block according to a distance from the division point (page 8, lines 45-50 and figure 14).

Referring to claim 8, Otani further discloses that the setting unit sets a reference data block (T1, T2, T3) in the search areas of a first image of the stereo image, and a search data block (U1, U2, U3) in the search areas of a second image of the stereo image, and decides a size of the search data block according to a size of each search area (page 8, line 51-page 9, line 10).

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Referring to claim 9, Otani further discloses that the setting unit sets a data block based on the set search area, the data block being smaller than the search area (page 8, lines 30-39), and the arithmetic operation unit sets a block equivalent to a data block of one image of the stereo image as a template (reference block), scans the other image of the stereo image in a vertical position similar to that of the template, and searches a data block corresponding to the template based on a calculated correlation value (page 7, lines 52-54 and page 10, lines 9-28).

Referring to claim 22, see the rejection of at least claim 1 above.

Referring to claim 23, see the rejection of at least claim 2 above.

Referring to claim 24, see the rejection of at least claim 3 above.

5. Claims 4, 7, 10, 25-27, 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Otani et al., EP Patent Application No. EP 0 880 010 A2 ("Otani"), Tanaka et al., U.S. Patent No. 5,943,442 ("Tanaka"), and Binns et al., U.S. Patent No. 6,041,140 ("Binns").

Referring to claim 4, Otani and Tanaka do not explicitly disclose that the setting unit selects points of measurement in an area where detailed division is required as new division points according to the result of the correlation processing executed by the arithmetic operation unit, and then sets new search areas on the stereo image.

Binns discloses the step of selecting points of measurement in an area where detailed division is required as new division points according to a result of a correlation processing executed by an arithmetic operation unit, and then sets new search areas on a stereo image [col. 9, lines 15-40. Note that the "certain regions...where better (correlation) results are needed" in lines 26-27 is interpreted as being analogous to the selected "points of measurement in an area

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where detailed division is required”. Binns explains that additional correlation processing is performed in the selected regions (col. 9, lines 27-29). Note that the correlation processing includes the step of setting a search area (col. 7, lines 46-58 and col. 9, lines 53-62). Therefore, performing the “additional correlation processing” in the selected regions results in a new search area being set].

Binns further discloses that the arithmetic operation unit executes correlation processing for images of the new search areas (col. 7, lines 46-67 and col. 9, lines 19-62).

Otani, Tanaka, and Binns are combinable because they are all concerned with image processing systems. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the setting unit of Otani and Tanaka so that it selects points of measurement in an area where detailed division is required based on a correlation processing, and then sets new search areas on the stereo image for correlation, as taught by Binns. The suggestion/motivation for doing so would have been to enhance the stereo imaging system by improving search efficiency and rejecting incorrect correlations (Binns, col. 2, lines 55-59). Therefore, it would have been obvious to combine Otani and Tanaka with Binns to obtain the invention as specified in claim 4.

Referring to claim 7, Otani further discloses that the setting unit sets a reference data block (T1, T2, T3) in the search areas of a first image of the stereo image, and a search data block (U1, U2, U3) in the search areas of a second image of the stereo image, sets a plurality of blocks having different sizes in the vicinity of the division point (figure 15), and obtains a result of correlation (page 10, lines 9-31).

Otani and Tanaka do not explicitly disclose that the size of a reference data block or search data block is decided according to the result of the correlation.

Binns discloses that a size of a data block (patch) is decided according to a result of a correlation process (col. 9, lines 15-34).

Otani, Tanaka, and Binns are combinable because they are all concerned with image processing systems. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the setting unit of Otani and Tanaka, so that the size of the data block is decided according to the result of the correlation, as taught by Binns. The suggestion/motivation for doing so would have been to enhance the stereo imaging system by improving search efficiency and rejecting incorrect correlations (Binns, col. 2, lines 55-59). Therefore, it would have been obvious to combine Otani and Tanaka with Binns to obtain the invention as specified in claim 7.

Referring to claim 10, Otani and Tanaka do not explicitly disclose a display unit for displaying a stereo image in a graphic manner.

Binns discloses a display unit for displaying a stereo image in a graphic manner (col. 9, lines 15-18), wherein other division points are selected according to an area determined to need additional measurement based on graphic displaying of the display unit [col. 9, lines 19-34. Note that the selected "certain regions...where better (correlation) results are needed" in lines 26-27 is interpreted as being analogous to the "other division points"], and a search area setting unit that sets new search areas [col. 9, lines 27-29. Binns explains that additional correlation processing is performed in the selected regions. Note that the correlation processing includes the step of setting a search area (col. 7, lines 46-58 and col. 9, lines 53-62). Therefore, performing the

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“additional correlation processing” in the selected regions results in a new search area being set], and an arithmetic operation unit that executes correlation processing for images of the new search areas (col. 7, lines 46-67 and col. 9, lines 19-62).

Otani, Tanaka, and Binns are combinable because they are all concerned with image processing systems. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include the display unit of Binns in the imaging system of Otani and Tanaka. The suggestion/motivation for doing so would have been to enhance the stereo imaging system by improving search efficiency and rejecting incorrect correlations (Binns, col. 2, lines 55-59). Therefore, it would have been obvious to combine Otani and Tanaka with Binns to obtain the invention as specified in claim 10.

Referring to claim 25, see the rejection of at least claim 4 above.

Referring to claim 26, Otani and Tanaka do not explicitly disclose that in the arithmetic operation step, information is prepared regarding an area of measurement where a new point of measurement is required according to the result of the correlation processing.

Binns discloses a stereo image measuring method that comprises an arithmetic operation step that prepares information regarding an area of measurement where a new point of measurement (correlation) is required according to a result of a correlation processing (col. 9, lines 12-40).

Otani, Tanaka, and Binns are combinable because they are all concerned with stereo image measuring devices. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the arithmetic operation step of Otani and Tanaka so that it prepares information regarding an area of measurement where a new point of measurement is

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required according to the result of the correlation processing, as taught by Binns. The suggestion/motivation for doing so would have been to enhance the stereo imaging system by improving search efficiency and rejecting incorrect correlations (Binns, col. 2, lines 55-59). Therefore, it would have been obvious to combine Otani and Tanaka with Binns to obtain the invention as specified in claim 26.

Referring to claim 27, Binns further discloses a displaying step for displaying a stereo image, wherein the displaying step executes predetermined displaying for an area where additional measurement (correlation) is required according to the information of the area of measurement prepared by the arithmetic operation unit (col. 9, lines 15-40).

Referring to claim 29, Binns further discloses that a measuring step outputs the information of the area of measurement prepared by the arithmetic operation unit to an auto-tracking total station, causes the total station to measure a position of a new point of measurement in an area indicated by the area data, and then receives the measured position data [col. 9, lines 15-40. Note that the image correlation processor (520) is interpreted as the auto-tracking total station. Binns explains that the operator may identify certain regions in the image that are inadequately correlated (lines 19-27). Binns further explains that the operator can limit additional correlation processing to the selected areas (lines 27-29). Note that the position of the new point of measurement (the regions that are inadequately correlated) must be measured in order to limit the additional correlation processing to that region].

Allowable Subject Matter

6. Claims 11, 14-21 are allowed.

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7. Claim 28 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles Kim whose telephone number is 571-272-7421. The examiner can normally be reached on Mon thru Thurs 8:30am to 6pm and alternating Fri 9:30am to 6pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on 571-272-7414. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



ck

April 12, 2005


Jon Chang
Primary Examiner